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PRELIMINARY REGULATORY EVALUATION, INITIAL REGULATORY FLEXIBILITY DETERMINATION, TRADE IMPACT ASSESSMENT, AND UNFUNDED MANDATES ASSESSMENT

FOR

NOTICE OF PROPOSED RULEMAKING:

SAFETY STANDARDS FOR FLIGHT GUIDANCE SYSTEMS

OFFICE OF AVIATION POLICY AND PLANS
AIRCRAFT REGULATORY ANALYSIS BRANCH, APO-320

Arnold J. Hoffman
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I. Introduction

The Federal Aviation Administration proposes to amend the airworthiness standards for transport category airplanes concerning flight guidance systems (FGS). The FGS assists the flightcrew in the basic control and guidance of the airplane. It provides workload relief to the flightcrew and a means to more accurately fly an intended flight path. The FGS comprises autopilot, autothrust, and flight director functions.

The proposed standards address the performance, safety, failure protection, alerting, and basic annunciation of these systems. This proposed rule is necessary to address flight guidance system vulnerabilities and to consolidate and standardize regulations for functions within those systems. This proposed rule would also bring the current regulations up to date regarding the latest technology and functionality. The FAA believes that adoption of this proposal would reduce significant regulatory differences between the airworthiness standards of the U.S. and the Joint Aviation Authorities of Europe.

II. Background

In response to a number of incidents and accidents that seemed to highlight difficulties for flightcrews interacting with the increasing automation of flight decks, the FAA formed a Human Factors Team (HFT). The team included representatives of NASA (the National Aeronautics and Space Administration) and the JAA (Joint Aviation Authority of Europe), as well as technical advisors from three major universities, who evaluated flightcrew/flight deck automation interfaces for the current generation of transport category airplanes. They issued a report on June 18, 1996,

entitled "The Interfaces Between Flightcrews and Modern Flight Deck Systems." A copy of the HFT report is included in the official docket.

The main impetus for the HFT study was an accident in Nagoya, Japan, on April 26, 1994, involving an Airbus 300-600 operated by China Airlines. Contributing to that accident were conflicting actions taken by the flightcrew and the airplane's autopilot. The flightcrew tried to correct the autopilot's directions. The resulting combination of out-of-trim conditions, high engine thrust, and flaps that were retracted too far led to a stall and a fatal crash. All 264 people aboard were killed. Although this particular accident involved an A300-600, other accidents, incidents, and safety indicators demonstrate that this problem is not confined to any one airplane type, manufacturer, operator, or geographic region. On November 12, 1995, an MD-80 operated by American Airlines descended below the minimum descent altitude, clipped some trees, and landed short of the runway, in what was very nearly a fatal accident. On July 13, 1996, a McDonnell Douglas MD-11 operated by American Airlines experienced an in-flight upset near Westerly, Rhode Island. When the airplane was cleared to descend to 24,000 feet, the first officer initiated a descent via the autopilot. With approximately 1,000 feet left in the descent, the captain became concerned that the airplane might not level off at the assigned altitude and instructed the first officer to slow the rate of descent. The first officer adjusted the pitch thumbwheel on the autopilot control panel. This maneuver proved ineffective. The captain then took manual control of the airplane, began applying back pressure to the control column, and disconnected the autopilot. Flight data recorder data show that the airplane experienced an immediate 2.3 G

pitch upset followed by additional oscillations, resulting in one passenger receiving serious injuries and one passenger and two flight attendants receiving minor injuries.

The HFT identified issues that show vulnerabilities in flightcrew management of automation and situation awareness. Specifically, there were major concerns about the issues of: (1) pilot understanding of automation's capabilities, limitations, modes, and operating principles and techniques and (2) differing pilot decisions about the appropriate automation level to use or whether to turn the automation on or off when they get into unusual or non-normal situations (this may lead to potential mismatches with the manufacturer's assumptions about how the flightcrew will use the automation).

There were also vulnerabilities in flightcrew situation awareness including both automation/mode and flight path awareness including insufficient terrain awareness (sometimes involving loss of control or controlled flight into terrain).

The team concluded that the above vulnerabilities exist because of a number of interrelated deficiencies in the current aviation system, such as insufficient communication and coordination and design, training, and regulatory functions that inadequately address human performance and/or cultural differences.

Not all of the wide-reaching problems uncovered by the human factors team can be corrected in one rulemaking project. The safety issues addressed

in this proposal are the following: (1) insufficient crew awareness of flight guidance system (FGS) behavior and operation; (2) hazardous autopilot transients resulting from disengagement, including a manual pilot override of an engaged autopilot; (3) FGS mode confusion resulting in crew errors (for instance, altitude violation); (4) history of lack of awareness of unusual/hazardous attitudes during FGS operations (accidents and incidents); (5) history of lack of speed awareness (accidents and incidents); and, (6) operation in icing conditions.

The following safety recommendations issued by the NTSB in recent years have also highlighted vulnerabilities in the flight guidance systems of today's transport airplanes:

- *NTSB Safety Recommendation A-92-035*: Revise Advisory Circular 25.1329-1A to add guidance regarding autopilot failures that can result in changes in attitude at rates that may be imperceptible to the flightcrew and thus remain undetected until the airplane reaches significant attitude deviations.
- *NTSB Safety Recommendation A-98-098*: Require manufacturers to incorporate into new and existing transport category airplanes that have autopilots installed a logic to provide a cockpit sound warning to alert pilots when the airplane's bank and/or pitch exceeds the autopilot's maximum bank and/or pitch command limits.
- *NTSB Safety Recommendation A-99-043*: Require all new transport category airplane autopilot systems to be designed to prevent upsets when manual inputs to the flight controls are made.

The several NTSB safety recommendations, as well as the FAA study discussed above, have all highlighted flight guidance system vulnerabilities. The current regulations (14 CFR 25.1329) regarding flight guidance systems address only the autopilot system, with the exception of one specific regulation regarding the flight director switch position (14 CFR 25.1335). The autothrust system, as it relates to flight guidance, is not addressed at all. Therefore, there is a need to consolidate and standardize regulations for all flight guidance system functionality (autopilot, autothrust, and flight director).

Also needed is an updating of existing regulations to match technology advances. Current regulations do not fully address the latest technology or new functionality available. In addition, new and recent rulemaking activity in areas such as the interaction of systems and structure, flight test, and human factors, will render certain aspects of the existing flight guidance systems regulations redundant, in conflict with other regulations, or confusing and difficult to understand. Finally, there is a need to harmonize regulations between the FAA and the Joint Aviation Authorities of Europe (JAA). Both the FAA and JAA consider harmonization of the two sets of standards a high priority.

III. Costs

This regulatory analysis estimates incremental costs incurred in meeting the proposed revisions to autopilot systems installed in new type-certificated part 25 airplanes. However, the Changed Product Rule (hereinafter, CPR), issued on June 7, 2000 under CFR § 21.101 "Designation of applicable regulations," may be invoked when a flight guidance system is being updated or added. Accordingly, if a proposed change to a flight

guidance system is part of a significant product change, then § 21.101(a) is applicable unless one of the other exceptions of § 21.101(b) applies. Section 21.101(a) states that "An applicant for a change must show that the changed product complies with the airworthiness requirements applicable to the category of the product in effect on the date of the application for the change and with parts 34 and 36 of this chapter." If a flight guidance system change is categorized as (or is part of) a product change that is not significant, then the applicable regulation would be § 21.101(b), which states that "an applicant may show that the changed product complies with an earlier amendment of a regulation required by paragraph (a) of this section." The operative question used to determine whether a change is significant or not is, "Does the change invalidate the original design and certification assumptions at the product level?" If the answer is "yes," an applicant must comply with the latest regulations, per § 21.101(a), unless one of the other exceptions of § 21.101(b) applies. If the answer is "no," an applicant may show that the product meets an earlier amendment of the regulation, provided that the earlier amendment has been determined by the FAA to be adequate.

The FAA's position on the CPR, based on the information contained in § 21.101 and AC 21.101-1, is that, when a change to a flight guidance system is made, or a new flight guidance system installed in an existing airplane, the only time that the change may be significant is when a substantially new function is included. If the original configuration of the airplane has not been changed and the certification assumptions remain valid, the applicant may choose to use a previous amendment of the regulations, as it applies to the autopilot system.

If a change is determined to be significant, one of the additional exceptions in § 21.101(b) is that the applicant may show that complying with the latest requirement is impractical. One way to demonstrate impracticality is to show that the additional cost of complying with the latest requirement exceeds the additional safety benefit gained in that compliance over the existing requirement. The FAA made a cost-benefit determination (as it would apply to any future changed product, e.g., per an amended or supplemental type certificate) under the CPR rule and that determination is valid at the time of certification of the relevant changed product. Therefore, a cost-benefit analysis of § 21.101 (the CPR) will **not** be reiterated in this rulemaking. [Note: There is a more detailed presentation of the implications of the CPR in the preamble to this rulemaking].

A. Summary of Proposed Changes

This NPRM **revises** paragraphs (a) through (h) and **adds** new paragraphs (i) through (m) of § 25.1329. Section 25.1329 would be renamed "Flight Guidance System and § 25.1335 would be deleted. Based on discussions between FAA and industry representatives of "The Flight Guidance System Harmonization Working Group" (FGSHWG) at meetings over the last two to three years, most of the proposed changes, **even the new requirements**, would not require incremental costs since manufacturers of part 25 airplanes already incorporate most of the proposed features in their current flight guidance systems. However, for manufacturers of part 25 business jets, there are incremental costs associated with three of the provisions: Autopilot override, § 25.1329(d) and (l); Speed protection, § 25.1329(h); and Pilot Awareness/Flight deck annunciation, § 25.1329(i). [New costs are discussed in Section B. below].

Proposed Changes to § 25.1329(a)

Paragraph (a) would be revised to contain the requirements pertaining to quick disengagement controls and their placement on both control wheels for easy accessibility [currently contained in (a), (c) and (d)]. Requirements for quick and easily accessible disengagement controls for the automatic thrust systems would be added.

Proposed Changes to § 25.1329(b)

This is a new requirement. It would mandate that designers and manufacturers must assess what would happen if a system fails to disengage the autopilot or autothrust when the pilot manually commands them. That failure would then have to be addressed in relation to § 25.1309, which requires, among other things, that a warning be provided to alert the crew to unsafe system operating conditions, and to enable them to take appropriate corrective action.

Proposed Changes to § 25.1329(c), (d), and (e)

Paragraphs (c), (d) and (e) are new regulations. They provide standards for transients for FGS engagement, switching, and normal and non-normal disengagements. The existing § 25.1329(b) addresses the need to limit transients during engagement, disengagement, and mode changes of the autopilot system. The wording of the current paragraph (b) is technically obsolete, as this requirement does not have any bearing on modern autopilot systems. The intent of this existing regulation is encompassed in these three new paragraphs.

It is the intent of these rule paragraphs that all FGS function disconnects, both manual and automatic, result in the least disturbance to the flight path of the airplane possible. Under more extreme operating conditions, it is acknowledged that a larger transient may indeed be impossible for the FGS to prevent by itself. Paragraph (e) is recognition of the fact that flight guidance systems will not be able to cope as well in these adverse conditions as they might in the relatively benign, no-failure conditions defined in paragraph (d). Therefore, the requirement for the allowable transient upon autopilot disengagement has been relaxed for these more adverse conditions. Unless the system design uses a specific flight deck alert to let the flightcrew know of a significant/sustained out-of-trim condition, compliance to these paragraphs should be based on the assumption that the pilot would respond reasonably to the upset event. The pilot should be "hands off" at the point of autopilot disengagement.

Proposed Changes to § 25.1329(f)

This new material is adapted from the requirement in the current § 25.1329(e) that attitude controls must operate relative to the sense of motion involved, including the effect of the control's motion and the plane's operation, as specified in §§ 25.777 and 25.779 for cockpit controls, with the direction of motion plainly indicated on, or adjacent to, each control.

Proposed Changes to § 25.1329(g)

Other than minor rewording and reformatting, this is the same requirement stated in the current § 25.1329(f). It mandates that the system must be designed so that it cannot produce hazardous loads on the airplane or create hazardous deviations in the flight path. This requirement applies during normal operation or in the event of a malfunction, assuming corrective action begins within a reasonable period of time. This requirement has been reworded and reformatted for clarity.

Proposed Changes to § 25.1329(h)

This is a new requirement for speed protection. It includes both high and low speed protection. It requires that when the flight guidance system is in use, a means must be provided to avoid excursions beyond an acceptable margin from the speed range of the normal flight envelope. If the airplane experiences an excursion outside this range, the flight guidance system must not provide guidance or control to an unsafe speed. The phrase "to an unsafe speed" is intended to mean that the flight guidance system should not control or provide guidance that would lead to an aerodynamic stall, or in excess of the maximum operating speed.

Proposed Changes to § 25.1329(i)

This new paragraph contains and expands on the current § 25.1329 (h) requirement for mode indications. It adds a statement of the safety objective to minimize crew errors and confusion. It addresses logical grouping and presentation of mode indications and controls for the sake of visibility from each pilot position and for flightcrew awareness of active

modes and mode changes. This new paragraph also incorporates the existing § 25.1335 provisions requiring indication of the mode of operation of any flight director.

Proposed Changes to § 25.1329(j)

This requirement for a visual and auditory warning of autopilot disengagement is adopted from the JAR 25.1329 (i) and does not exist in the current 14 CFR part 25. The current JAR requirement is valid because disengagement of the autopilot, for whatever reason, necessitates timely flightcrew intervention to assume manual control of the airplane. Timely, in this case, is meant to specify a time period that is appropriate for the specific situation, without mandating a specific time period within the rule itself. The requirement that the warning look and sound distinct from other cockpit warnings is meant to provide unequivocal awareness that the flightcrew must assume manual control of the airplane.

Proposed Changes to § 25.1329(k)

This paragraph is a new requirement. It mandates that a “caution” be provided to each pilot when the autothrust has been disengaged. The flightcrew needs to be aware that the autothrust system has disengaged, so that they do not continue to expect the desired speed control to be provided. Normally, however, autothrust disengagement would not require immediate thrust control changes by the flightcrew. Hence the less specific “caution” rather than “warning” is required.

Proposed Changes to § 25.1329(l)

This new paragraph requires that flightcrew override of the autopilot must not place the airplane in a configuration that would result in a significant transient if the autopilot were disconnected or when the flightcrew releases the flight controls. As stated previously, an override occurs when the pilot or first officer applies input to the flight deck controls without first manually disengaging the autopilot. Pilot override may not always result in autopilot disengagement. If the autopilot does not disengage during override, the result might be an out-of-trim condition (for example, a horizontal stabilizer/elevator jackknife), which could result in a significant transient if the autopilot were to be disconnected or if the pilot were to suddenly release the force being applied to the flight deck controls.

Proposed Changes to § 25.1329(m)

This new paragraph requires that the flightcrew be able to move the thrust levers during autothrust operation without using excessive force. It requires that the autothrust response to flightcrew override must not result in an abrupt or excessive change of thrust when the flightcrew releases the thrust levers, or if the autothrust system were to be disconnected during or immediately after the flightcrew override. There may be times when the flightcrew needs to immediately change thrust without first manually disengaging the autothrust system. There may be cases when the normal controls for disengaging the autothrust system have failed and the ability to override the autothrust system is the only means available to manually control thrust.

B. Revisions with Costs Incremental to Current Autopilot Requirements

(Table 1 attached to this document summarizes the costs that follow)

The revised requirements would essentially affect smaller part 25 transport airplanes (turboprops and regional jets) and business jets; larger part 25 commercial airplanes either already meet the new requirements or would have only minor costs in complying. Since turboprops and regional jets are not currently manufactured in the United States, this NPRM would only affect U.S.-manufactured business jets.

Based on historical averages from industry fleet data, four new type-certificates (i.e., TC's – for new airplane models) involving part 25 business jets are projected in the next ten years; annual production of these models is expected to be 220 units. Thus, in the 10-year period covered in the cost analysis (and presented in the table attached at the end of this document), there are a total of 2,200 new production airplanes. [Each airplane is assumed to operate for 25 years – see Benefits section below]. Incremental costs include nonrecurring costs for design, testing, etc. for each project, and recurring equipment or modification 'one-time' costs applied to each airplane produced (there are no measurable additional operating costs). Costs were submitted by industry representatives attending the FGSHWG meetings. The relevant changes and associated incremental costs are as follows:

1. Autopilot Override - Nonrecurring costs (design, development, and/or testing) related to installation of a force sensor (new force transducer) on control column totals $200,000 for a new TC. Recurring costs (per unit) for a new force transducer equal $12,000.

2. Pilot Awareness/Flight Deck Annunciation – Nonrecurring costs total $120,000; recurring costs are minimal (essentially no new costs).

3. Speed Protection - Nonrecurring costs total $210,000; recurring costs equal $40,000 (this amount may include new or modified components such as sensors).

C. Summary of Costs

As shown in the cost table at the end of this document, non-recurring and recurring costs total $116,520,000, or $96,553,992 at present value. Present value costs are based on a 3% discount factor, which is allowed by the Office of Management and Budget where a study period covers 25 or more years; the combined costs-benefits period of analysis covers 36 years – 2005 to 2040.

IV. Benefits

[To capture estimated benefits of these airplanes over their assumed 25-year service lives, benefits are calculated over a 34-year period, i.e., the last airplanes produced (in 'year-ten' of the production cycle in this analysis) would cease operating 34 years after the first new airplanes ('year-one' production) commence operating; implicit in this is a one-year lag between production and operation. See further details below.]

As discussed earlier in the Background section, the three accidents that provided much of the impetus for this proposal involved larger transports. The most serious accident (all aboard the airplane perished) involved a foreign carrier and occurred on foreign soil; this cost/benefit analysis

assesses impacts on the U.S. economy only. Two other accidents involved U.S. carriers in U.S. airspace; however, these resulted in three or four serious injuries and essentially no damage to the airplane.

However, industry working group members reported that current TC's involving the larger commercial airplanes now meet the key provisions of the NPRM; thus, future averted accidents (benefits) relevant to meeting the costs of the proposal (and, therefore, justifying this NPRM) must be limited to part 25 business jets.

According to FAA and NTSB accident/incident data, during a 20-year period (1983-2002), four business jets were involved in four serious events (i.e., damage and injuries or fatalities) wherein the autopilot was directly or indirectly involved. One of these was classified as an accident in that it resulted in two fatalities and destruction of the airplane. The determined cause of the accident was a mechanical malfunction of the autopilot; the technical changes required in this NPRM may not prevent such a failure in the future. It's also not certain whether or not the three serious incidents could be averted by the proposed changes. There were also 13 less serious incidents in FAA's database (1978-2003) involving autopilots in business jets; three of these type events could possibly be prevented by this proposal since they involved autopilot disconnect and/or improper pilot procedures.

Nevertheless, the FAA does believe there is a potential for future more serious accidents involving business jets. Manufacturers and/or operators have only recently begun installing the more complex autopilot systems in these airplanes. Consequently, one would have expected fewer and less serious events involving autopilots in the two databases examined. As

noted in the introduction to this analysis, difficulties for flightcrews interacting with the increasing automation of flight decks in larger commercial part 25 airplanes prompted this rulemaking. Although, the one catastrophic accident occurred overseas, there were fifteen U.S. accidents/incidents involving part 25 transports in the same period. Analysis showed that about one-fourth of these would probably be prevented by the changes called for in this proposal. Since two of these involved large turboprops not made in the U.S. (hence not included in the cost analysis), they are excluded from the benefits analysis. Two others involved U.S.-made large part 25 transport airplanes. However, manufacturers of these airplanes now voluntarily incorporate the equipment changes in their current autopilot systems; costs voluntarily incurred are excluded from this analysis, as are their associated future benefits.

The FAA strongly believes that despite no aligned serious accidents involving part 25 business jets, there is sufficient historical evidence of autopilot risk that has not been resolved for these airplanes, especially as they increasingly incorporate more sophisticated autopilot systems. As the number of large business jets with complex systems increases (220 newly-produced airplanes annually), the risk of potential accidents/incidents increases accordingly. Consequently, the FAA has estimated the minimum levels of averted losses, in terms of avoided fatalities and airplane damage **(each accident is valued at $40 million, i.e., ten fatalities at $3 million each plus $10 million airplane replacement value)** that would be necessary to offset the estimated compliance costs. The resulting benefits are determined as follows.

The FAA assumed that in the absence of a rule, potential accidents would be distributed evenly over the period of analysis, and directly related to

the number of airplanes operating. So, in this analysis, the new airplanes (with the updated autopilots) are assumed to operate for 25 years. Thus, assuming production begins two years after a final rule is promulgated (or, in 2006, assuming the rule is published in late 2004), the operating period of the updated airplanes would be from 2007 to 2040, a 34-year period; 220 of these airplanes operate in year one, increase by 220 annually until they reach 2,200 (in years ten to twenty-five), then decline by 220 per year, ending with 220 in year thirty-four. Given this distribution (i.e., akin to a bell-shaped curve, but with a 'flat top'), whatever number of accidents would have occurred in absence of a final rule, one-half of that number would have accumulated by the end of the 17th year of operation, which is the midpoint of the 34-year operating period (operation of the new airplanes would commence at the beginning of the third year following publication of a final rule, or an estimated three to four years from the date of this analysis). Mathematically, this is essentially equivalent to all of the "projected" accidents occurring at the end of the 17th year of operation (i.e., year-end 2023). **Dividing present value costs of $96,553,992 by .5703 (19-year present value factor at 3%) results in undiscounted benefits of $169,303,863; this value of postulated accidents has a present value (in 2004) equivalent to that of the costs ($96,553,992). Dividing the $169,303,863 in benefits by $40 million, the average value of an averted accident, results in approximately four averted accidents necessary to make the proposed rule cost-beneficial.** As noted above, there were four serious events involving business jets over the 20-year period examined; thus, over the future 34 years evaluated in this benefits' analysis, **in the absence of a rule, one could expect nearly twice that number, or seven.** Although it is not certain that the earlier accidents could have been prevented by the proposed autopilot changes (or, how many of the "predicted" future

accidents would in fact be catastrophic), the expected prevalence of more sophisticated autopilot systems in new-production business jets, combined with the occurrence of at least one catastrophic accident involving a larger commercial airplane (overseas), mandates regulatory action. For these reasons, the FAA finds this proposed rule to be cost-beneficial.

V. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation." To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis as described in the Act. However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The proposed rule would affect manufacturers of part 25 airplanes produced under future new type-certificates. For manufacturers, a small entity is one with 1,500 or fewer employees. None of the part 25 manufacturers have 1,500 or fewer employees; consequently, none are considered to be small entities.

Based on the above, the FAA certifies that the proposed rule would not have a significant economic impact on a substantial number of small entities. The FAA invites comments on the estimated small entity impact from interested and affected parties.

VI. International Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards.

In accordance with the above statute, the FAA has assessed the potential effect of this proposed rule for airplanes produced under FAR part 25. This rulemaking is consistent with the Trade Agreement Act since international and U.S. standards would be compatible.

VII. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that will impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

The FAA determines that this proposed rule does not contain a significant intergovernmental mandate.

Table 1. Summary of Part 25 Costs							
	A	B	C	D	E	F	G
	Non-Recurring Costs	Recurring Costs (per unit)[2]	Units	Total Recurring Costs	Total All Costs	Discount Rate	Present Value
Year	TC[1]			B x C	A + D		E x F
2005	$530,000			$0	$530,000	0.9709	$514,563
2006		$52,000	220	$11,440,000	$11,440,000	0.9426	$10,783,297
2007		$52,000	220	$11,440,000	$11,440,000	0.9151	$10,469,221
2008	$530,000	$52,000	220	$11,440,000	$11,970,000	0.8885	$10,635,190
2009		$52,000	220	$11,440,000	$11,440,000	0.8626	$9,868,244
2010		$52,000	220	$11,440,000	$11,440,000	0.8375	$9,580,820
2011	$530,000	$52,000	220	$11,440,000	$11,970,000	0.8131	$9,732,705
2012		$52,000	220	$11,440,000	$11,440,000	0.7894	$9,030,842
2013		$52,000	220	$11,440,000	$11,440,000	0.7664	$8,767,807
2014	$530,000	$52,000	220	$11,440,000	$11,970,000	0.7441	$8,906,804
2015		$52,000	220	$11,440,000	$11,440,000	0.7224	$8,264,499
Total	$2,120,000			$114,400,000	$116,520,000		$96,553,992

1) Estimated non-recurring design, development, and testing costs associated with new force transducers for the autopilot override system, new flight deck alert system, and speed protection are $200,000, $120,000, and $210,000, respectively.

2) Includes $12,000 related to autopilot override and $40,000 for speed protection